Section 3.4 - Predictions & Lines: y = mx + b

Curriculum Outcomes	Related Activities	Page in Text
• determine the slope and y-intercept of a line from a table of values	• an investigation explores the connection between the values of m and b in an equation, the graph of the equation, and the original situation	118
• determine the equation of a line using the slope and y-intercept	• a Focus shows the connection between the graph, equation, and the m and b and demonstrates how slope can be found and why it is important	117
• rearrange equations	• students solve problems using the skills they have learned with writing equations in the form y = mx + b • students investigate how to find equations of straight lines from limited information and use the equations to solve problems	122 126
• graph by constructing a table of values, by using graphing technology, and when appropriate by intercept-slope method	• students rearrange equations and formulas in order to graph the equation of enter formulas into a spreadsheet.	128

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- The equations we have been dealing with are linear equations or equations of lines.

- Equations of lines can be written in y = mx + b format or slope y-intercept form which is also known as standard form.

- To be able to determine the equation of a line we need 2 things: 1. a slope
  2. a point on the line

Oct 29-7:47 PM

SLOPE:

- the steepness of a line
- in equation form it is the coefficient of the variable x.
- in the format y = mx + b m = slope

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Types of Slopes:

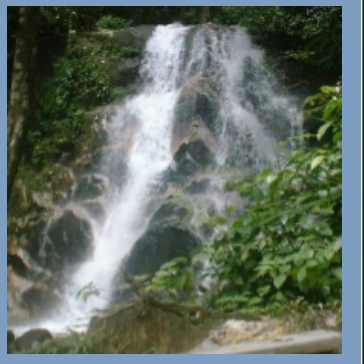
Slope

Positive

Negative

Undefined

Zero



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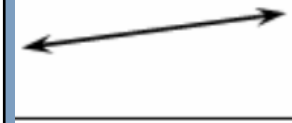
Steepness of Slopes:

Examples of Slopes for Steepness			
			
Not Steep	A Little Steeper	Even Steeper	Very Steep
Slope = 0.1	Slope = 1	Slope = 2	Slope = 4

Small slope **Large slope**

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How to Find Slope:

1. From the equation $y = mx + b$

the number found where the "m" is

Examples:

1. $y = -2x + 3$

$m = -2$

2. $y = \frac{1}{3}x - 2$

$m = \frac{1}{3}$

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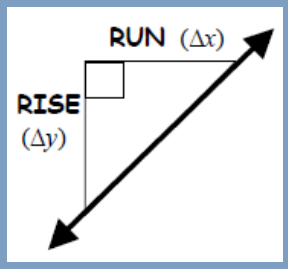
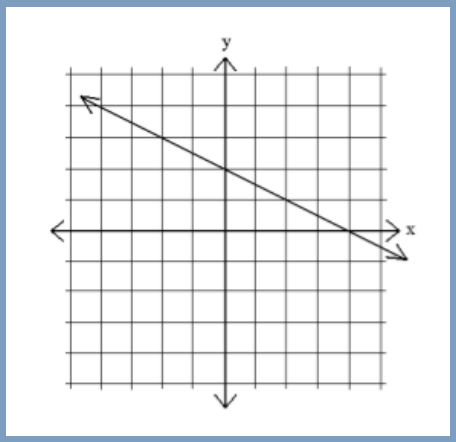
2 From a graph using $\frac{\text{rise}}{\text{run}}$



Examples:

1.



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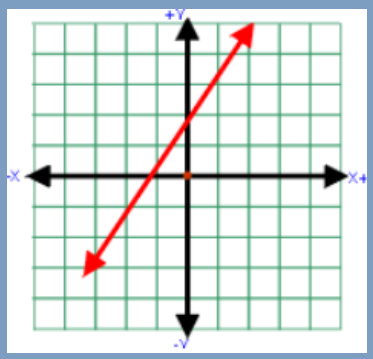

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3 From 2 co-ordinate points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ → y being the 2nd number in a co-ordinate (x,y)

→ x being the 1st number in a co-ordinate (x,y)

Examples:

1. (2, 7) & (5,1)
   $x_1\ y_1$ $x_2\ y_2$

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-7}{5-2} = \frac{-6}{3} = -2$

2. (-2,5) & (-5, 5)

$\frac{5-5}{-5+2} = \frac{0}{-3}$

zero

undefined

$\frac{3}{0} =$

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Pg. 129 #2, 3) show work for #2

2.a. $(1,1)$ $(4,3)$ Take out

$\frac{3-1}{4-1} = \frac{2}{3}$ $m = \frac{2}{3}$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

(2) e. $(5,3)$ $(7,3)$

slope $\frac{3-3}{5-7} = \frac{0}{-2}$ $m = 0$

(h) $(2,-3)$ $(0,4)$

$\frac{4--3}{0-2} = \frac{7}{-2}$ $m = -3.5$

(3) g. $(0.5,3)$ $(2,-3)$

$\frac{-3-3}{2-0.5} = \frac{-6}{1.5} = -4$ $m = -4$

Nov 12-2:58 PM

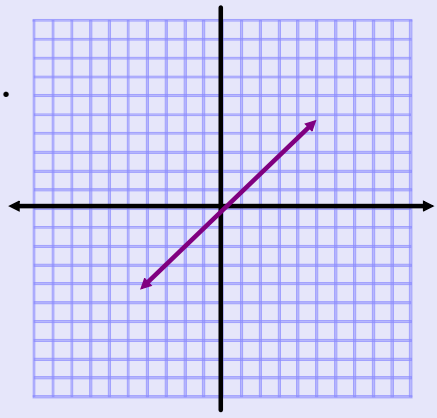
Practice:

State what the slope is for each of the following questions:

1. y = -2/3x +2

$m = -2/3$

2.



3. (1,4) (-8, -7)

$\frac{-7-4}{-8-1} =$

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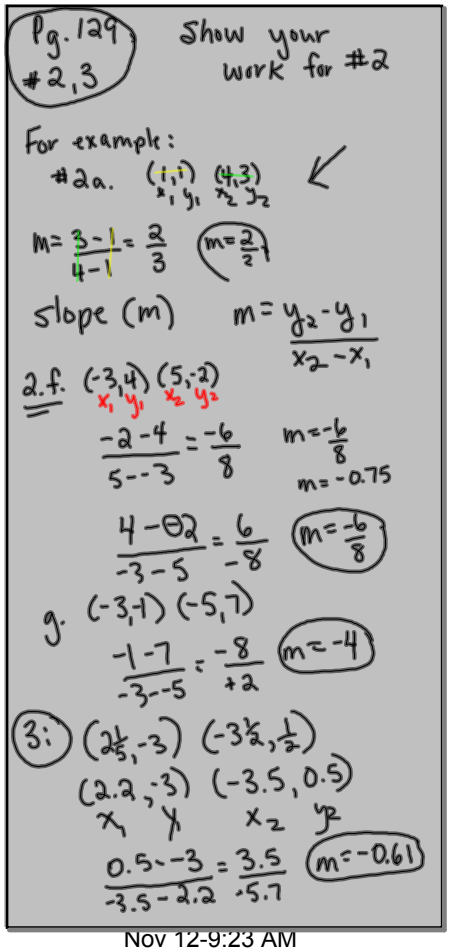
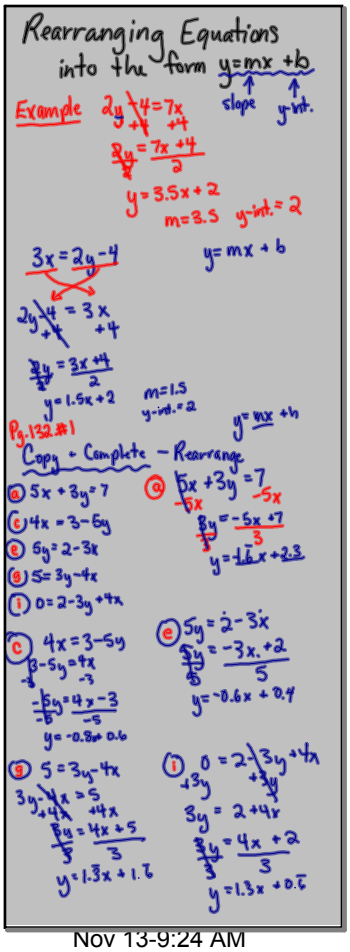


Nov 12-9:23 AM



Nov 13-9:24 AM

Pg. 132 #1 Rearranging Equations into the form $y = mx + b$ (m: slope, b: y-int.)

(d) $7x + 2 = -3y$

$\frac{-3y}{-3} = \frac{7x + 2}{-3}$

$y = -2.\overline{3}x - 0.6$

(k) $0 = 2 + 3y + 4x$

$-3y \quad +3y$

$\frac{3y}{3} = \frac{2 + 4x}{3}$

$y = \frac{2}{3} + \frac{4}{3}x$

$y = \frac{4}{3}x + \frac{2}{3}$

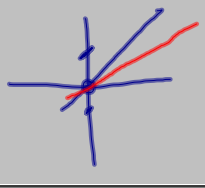
$y = mx + b$

(h) $3x - 4y = 0$

$-3x \quad -3x$

$\frac{-4y}{-4} = \frac{-3x}{-4}$

$y = \frac{3}{4}x + 0$ (m = $\frac{3}{4}$, +5 = 0)



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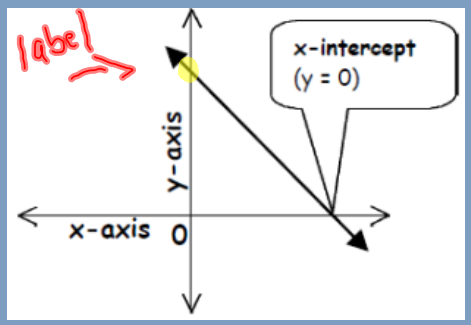
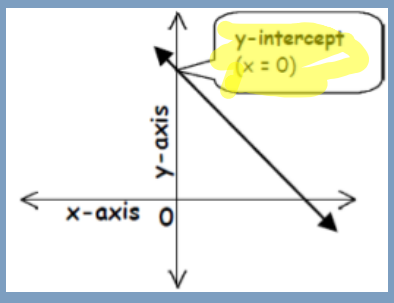
X and Y Intercepts:

X-intercept= the point where a graph (line) crosses the x-axis; the point where $y = 0$*

y-intercept= the point where a graph (line) crosses the y-axis; the point where $x = 0$*





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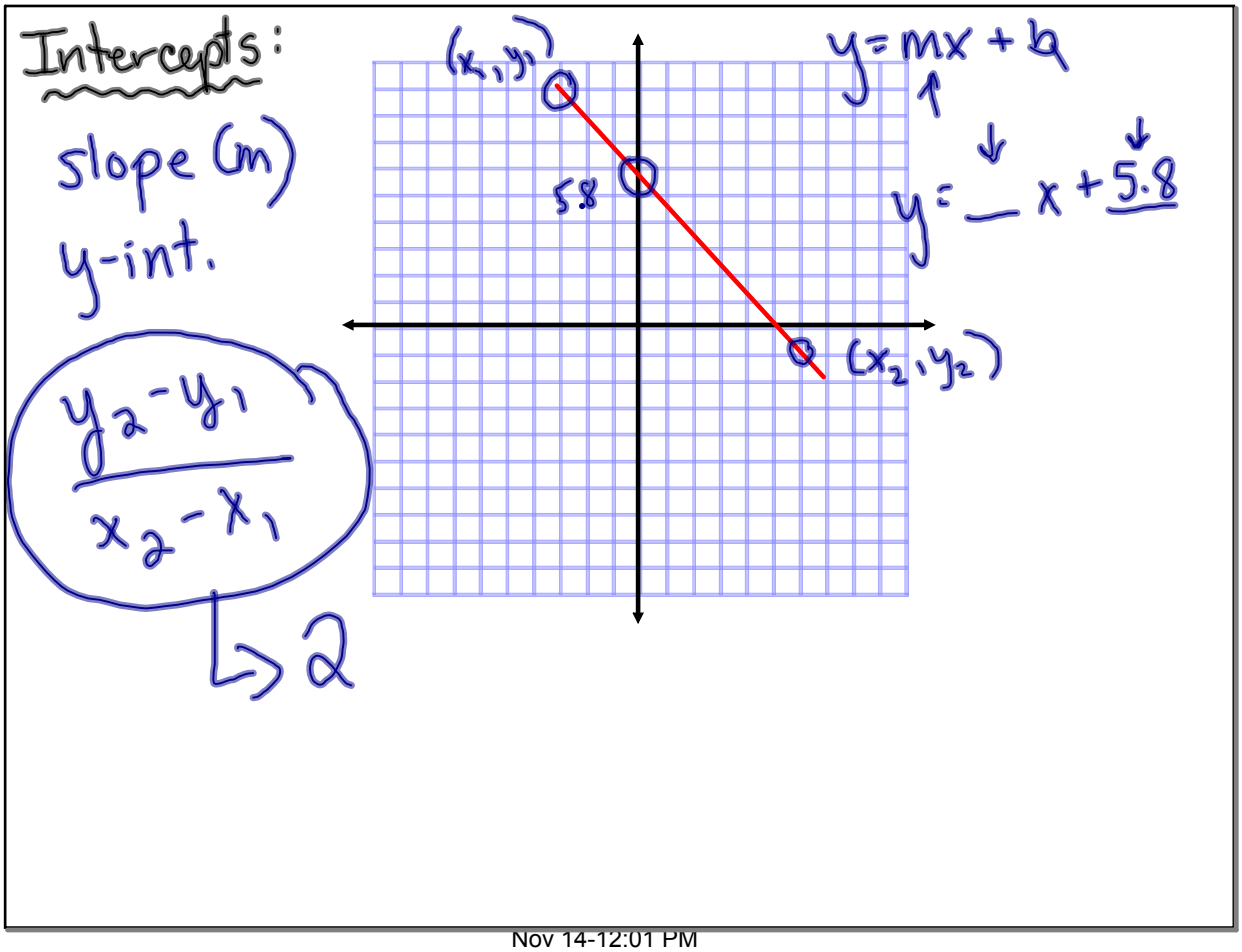

Nov 14-12:01 PM

How to Find The X & Y Intercept:

Determine the x-intercept for 2x + y = 8.

Solution:

Let y = 0 → 2x + (0) = 8

Solve for x → 2x = 8

x = 4

x-intercept is → 4 or (4, 0)

Determine the y-intercept for 2x + y = 8.

Solution:

Let x = 0 → 2(0) + y = 8

Solve for y → y = 8

y-intercept is → 8 or (0, 8)

Nov 9-11:55 AM

Practice:

Find the x and y intercept for the following equations & write them in y=mx + b form and find the intercepts (x and Y):

1. ~~3x + y = 9~~

2. ~~5x + y = 20~~

3. 3/4 x + y = 8

a) Rearrange ($y=mx+b$)

$y=-3x+9$

b) x-intercept ($y=0$)

$0=-3x+9$

Solve for x

$x=3$

$(3,0)$

$-9=-3x$

$x=3$

c) y-intercept ($x=0$)

$y=-3x$

$y=-3(0)+9$

$y=0+9$

$y=9$

Nov 9-12:11 PM

Pg. 117 - Focus 6

→ you will learn how an equation ($y=mx+b$) relates to a graph

Slope - means "rate"
- growth rate
- speed
- $/hr

Example:
- speed (m/s) (km/hr)

y-int. = 20 → $y=mx+b$, $y=mx+20$

slope? $m=\frac{y_2-y_1}{x_2-x_1}$

(0,20)

(10,40)

$m=\frac{40-20}{10-0}$

$m=\frac{20}{10}$

$m=2$

$y=2x+20$

base fee = 20

hourly rate = $2/hr.

Pg

Nov 14-1:48 PM

Pg. 118 Investigation 5

A, B, C #1-4

$y = mx + b$ (,) (,)

$m =$

y-int =

$y = \_\_ x + \_\_$

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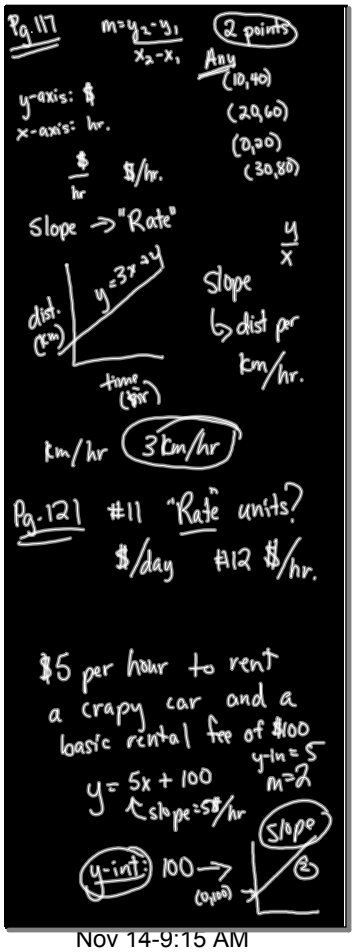

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Pg. 117

- y-int. is 20
- slope (m) $m = \frac{y_2 - y_1}{x_2 - x_1}$ (10,40) (20,60)

$= \frac{60-40}{20-10} = \frac{20}{10} = 2$

$m = 2$

- Eqn. of the line: $y = mx + b$

$y = 2x + 20$

$2/hr$ 20 fee

5 hours of use:

$y = 2(5) + 20$

$y = 10 + 20$

$y = 30$

It costs $30 for 5 hrs. of use.

$y = mx + b$ $m = \frac{y_2 - y_1}{x_2 - x_1}$

"rate" means slope

"basic fee" means y-int.

Nov 14-9:31 AM

Investigation 5 Pg. 118-119

Answer A, B, C

#1-4

(A) $y = mx + b$ m = slope, b = y-int.

Company 1 (12,45) (0,10)

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $m = \frac{45-10}{12-0} = \frac{35}{12}$ $m = 2.9$

$y = 2.9x + 10$

(B) Company 2 (0,20) (10,35)

$m = \frac{35-20}{10-0} = \frac{15}{10}$ $m = 1.5$

$y = 1.5x + 20$

(C) Company 3 (2,20) (8,35)

$m = \frac{35-20}{8-2} = \frac{15}{6}$ $m = 2.5$

$y = 2.5x + 15$

Domain $\{x \mid x \geq 0, x \in R\}$

Range $\{y \mid y \geq 15, y \in R\}$

Nov 16-10:23 PM

#1

$50 = 2.9x + 10$

$-10 \qquad -10$

$\frac{40}{2.9} = \frac{2.9x}{2.9}$ $\quad x = 13.8$

C#1 → 13.8 hrs

$50 = 1.5x + 20$

$-20 \qquad -20$

$\frac{30}{1.5} = \frac{1.5x}{1.5}$ $\quad x = 20$

C#2 → 20 hrs

$50 = 2.5x + 15$

$-15 \qquad -15$

$\frac{35}{2.5} = \frac{2.5x}{2.5}$ $\quad x = 14$ hrs

I would use Company 2 because you can get the greatest number of hours.

20 hrs.

Nov 17-8:59 AM

Pg. 119 #5

(a) speed: Km/hr. slope = $\frac{y_2 - y_1}{x_2 - x_1} \cdot \frac{Km}{h}$

slope = $m = \frac{y_2 - y_1}{x_2 - x_1}$ (0,100) (10,1100)

$m = \frac{1100 - 100}{10 - 0} = \frac{1000}{10}$

$m = 100$

100 km/hr.

The car is going 100 km/hr. for the entire trip.

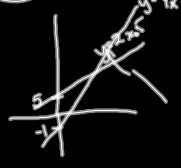
(b) how far? - Km y-int.

100 km from home.

#6 $y = (m)x + (b)$

#7

#8 (a) $y = 2x + 5$ $y = 4x - 1$ \$2/hr. \$5



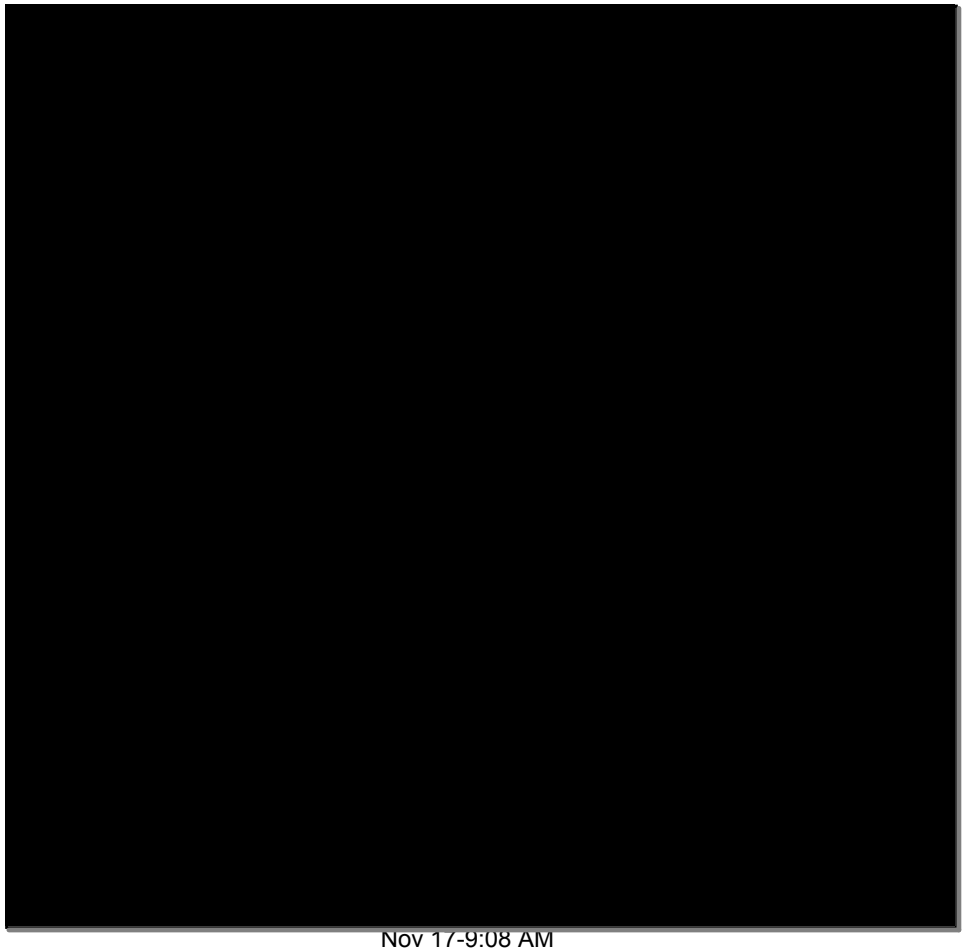
$y = 2x + 5$

$y = 4x - 1$

Pg. 120 - 121

6 - 12

Nov 17-9:08 AM



Nov 17-9:08 AM

For each question, you need to find the equation of the line (y=mx+b) and then answer the questions.

Classwork/Homework

Pg. 119-121 # 5-12

Nov 16-10:24 PM

Attachments

Sec 3.4 - Slopes.doc

Sec 3.4 - Write the equation of a line (1).doc